

Application No. 10/061,576
Filed: February 1, 2002
TC Art Unit: 3663
Confirmation No.: 9666

REMARKS

The instant Amendment is filed in response to the official action dated July 6, 2004.. Reconsideration is respectfully requested.

The status of the claims is as follows.

Claims 1-20 are pending in the application.

Claims 1-20 stand rejected.

Claims 1, 3-10, and 13-19 have been amended.

Claim 21-25 have been added.

The Examiner has rejected claim 1 under 35 U.S.C. 102(e) as being anticipated by Bass et al. (US 2004/0079524) or Vinegar et al. (US 2002/0029883). Specifically, the official action indicates that the Bass reference discloses a computer system 64 at a surface 36, a surface modem 39, the computer system and a modem 38, a control module 110, and a modem 122 that receives signals from the computer system 64 (see Figs. 1-2 of Bass et al.). The Applicants respectfully submit, however, that neither the Bass reference nor the Vinegar reference discloses each and every element or limitation of amended claim 1, and therefore the rejection of claim 1 under section 102 of the Patent Laws is unwarranted and should be withdrawn.

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Specifically, the Applicants respectfully submit that neither the Bass reference nor the Vinegar reference discloses an adaptive downhole telemetry and power system for use in an environment comprising a borehole extending into a formation, in which the system includes a surface data processor, a surface modem, a downhole modem, a retentive memory, and a downhole processor, as recited in amended claim 1. More specifically, neither the Bass reference nor the Vinegar reference discloses a surface data processor for providing first data and commands in a data packet format including at least one field allocatable for executable digital signal processing code, a surface modem for modulating a first signal having a first frequency band with the first data and commands in a first modulation scheme to provide a first transmitted command and data signal, a downhole modem for recovering the first data and commands including the executable code from the first transmitted signal, a retentive memory for storing the recovered first data and commands, and a downhole processor for receiving the recovered first data and commands and for storing the first data and commands in the retentive memory, in which the surface data processor can reprogram the downhole modem and/or the downhole processor with the executable code, and the downhole modem and/or the downhole processor can implement the

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executable code to perform at least one algorithm for adapting the system to the borehole environment, as recited in amended claim 1.

The Applicants have presented the notion of providing an adaptive downhole telemetry and power system that includes a surface data processor for providing data and commands in a data packet format including executable digital signal processing code, and a downhole modem and processor that can be reprogrammed in such manner that they will execute the executable code, in which event the downhole modem and processor implement at least one algorithm for adapting the system to the borehole environment. This notion is described throughout the instant application, for example, see page 4, lines 3-4 and 7-11 (re-programming with new algorithms and communications system parameters); page 12, lines 7-24 (adjustment of communications system parameters via the data packet field); page 15, lines 6-17 (data packet format); page 27, line 25, to page 28, line 1 (adaptive system); page 28, lines 29-32 (adaptive system); page 31, line 31, to page 32, line 29 (re-programming of processors and modems to optimize the system based on environmental conditions); and, original claims 4 and 14 (executable digital signal processing code), of the application.

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In contrast, the Bass reference merely discloses a system for use in a petroleum well that includes a modem capable of providing control signals to a controllable valve for controlling a gas flow through the valve (see paragraph [0013] of Bass et al.). Similarly, the Vinegar reference merely discloses a system for fluid flow optimization including a modem for providing control signals to a controllable gas-lift valve (see paragraph [0015] of Vinegar et al.).

The Applicants respectfully submit that the subject matter of amended claim 1 is significantly different from the teachings of the Bass and Vinegar references. In fact, the Bass and Vinegar references are merely representative of the prior art, as described by the Applicants on pages 1-3 of the application. For example, the Applicants indicate that one way conventional systems provide for increased efficiency in the operation of oil or gas wells is to place controllable equipment such as controllable valves downhole in the well bore under the control of computers located on the surface (see page 1, lines 23-26, of the application). The Applicants further indicate that several prior art methods have attempted to provide power and communications between the surface equipment and the downhole equipment (see page 1, lines 26-28, of the application). The

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Applicants respectfully point out that the Bass and Vinegar references teach nothing more than what has already been admitted as prior art by the Applicants. Significantly, the Bass and Vinegar references provide no disclosure relating to an adaptive downhole telemetry and power system, in which downhole equipment such as downhole processors and downhole modems can be reprogrammed with executable code and can implement the executable code for performing at least one algorithm to adapt the system to the environment of a borehole, as recited in amended claim 1.

Important advantages are derived by providing an adaptive downhole telemetry and power system, as recited in amended claim 1 and the claims dependent therefrom. For example, because it is virtually impossible to estimate propagation attenuation, signal reflections, etc., in a particular borehole environment, providing an adaptive downhole telemetry and power system, as recited in amended claim 1, allows users to adapt the system to the particular signal transmission characteristics of the environment after downhole equipment is in place. This obviates the need to pull the downhole equipment out of the borehole to make the required equipment adjustments, which can be time consuming and very expensive. Further, because characteristics

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of the borehole can change over time, providing the adaptive downhole telemetry and power system of amended claim 1 allows users to adapt the system to the changing environmental conditions, thereby significantly extending the lifetime of the system. Moreover, it is well known that software is seldom perfect, particularly in the early developmental stages of a technology. Providing the adaptive downhole telemetry and power system of amended claim 1 allows users to reprogram the downhole equipment including the downhole modem and processor to correct software bugs that might show up after deployment of the downhole equipment, and to upgrade the software based on deployment experience. Neither the Bass reference nor the Vinegar reference teaches or suggests such important advantages of the claimed system.

Because the Bass and Vinegar references do not disclose an adaptive downhole telemetry and power system that includes a surface data processor for providing data and commands in a data packet format including executable digital signal processing code, and a downhole modem and processor that can be reprogrammed using the executable code, in which the downhole modem and processor can implement the executable code to perform at least one algorithm for adapting the system to the borehole

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environment, as recited in amended claim 1, the Applicants respectfully submit that neither the Bass reference nor the Vinegar reference anticipates amended claim 1 and the claims dependent therefrom. Accordingly, it is respectfully submitted that the rejection of claim 1 under 35 U.S.C. 102 is unwarranted and should be withdrawn.

The Examiner has rejected claims 1-20 under 35 U.S.C. 103(a) as being unpatentable over Bass et al. or Vinegar et al. Specifically, the official action indicates that the use of a surface data processor, a surface modem, a downhole modem, a retentive memory, and a downhole processor with the systems of Bass et al. or Vinegar et al. would have been obvious to one of ordinary skill in the art. The Applicants respectfully submit, however, that all of the limitations of amended claim 1 have not been considered, and therefore the rejections of the claims under section 103 of the Patent Laws are unwarranted and should be withdrawn.

It is well settled that to consider the subject matter "as a whole" under 35 U.S.C. 103 affirmatively involves taking into account all of the limitations of a claim. Because the official action fails to take into account all of the limitations of

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amended claim 1, the rejections of the claims under section 103 of the Patent Laws cannot stand.

The Applicants respectfully point out that the Bass and Vinegar references merely address problems related to determining and regulating existing flow regimes of oil and gas to obtain a desired downhole flow regime (see paragraph [0008] of Bass et al.; see paragraph [0023] of Vinegar et al.). To that end, the Bass and Vinegar references disclose controllable equipment such as controllable valves placed downhole in a well bore under the control of computers located on the surface (see paragraph [0012] of Bass et al.; see paragraph [0015] of Vinegar et al.).

In contrast, the Applicants' system focuses on the problem of adapting a downhole telemetry and power system to the particular characteristics of a borehole environment, including transferring power, control, and data signals in the harsh environments of gas and oil wells (see page 31, line 31, to page 32, line 3, of the application). To that end, the Applicants provide an adaptive downhole telemetry and power system that includes a surface data processor for providing data and commands in a data packet format including executable digital signal processing code, and a downhole modem and processor that can be reprogrammed using the executable code, in which the

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downhole modem and processor can implement the executable code to perform at least one algorithm for adapting the system to the borehole environment, as recited in amended claim 1.

The Applicants respectfully submit that the cited Bass and Vinegar references do not address the problem solved by the Applicants' system. The Applicants further submit that the Bass and Vinegar references neither teach nor suggest all of the system elements/limitations required to solve this problem, as recited in amended claim 1. For at least these reasons, it is respectfully submitted that the suggested combination of the Bass and Vinegar references does not render amended claim 1 and the claims dependent therefrom obvious. Accordingly, the Applicants respectfully submit that the rejections of claims 1-20 under 35 U.S.C. 103 are unwarranted and should be withdrawn.

The limitations of new claims 21-25 are disclosed throughout the instant application, for example, see page 32, lines 23-29 (claim 21), page 10, lines 2-4 (claim 22), page 11, lines 13-17 (claims 23-24), page 17, lines 4-7 (claim 25), of the application. The Applicants respectfully submit that new claims 21-25 recite non-obvious subject matter that distinguishes over the cited references.

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In addition, the specification has been amended to correct several typographical errors found in the original application as filed. No new matter has been added.

In view of the foregoing, it is respectfully submitted that the present application is in a condition for allowance. Early and favorable action is respectfully requested.

The Examiner is encouraged to telephone the undersigned Attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

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